AF/2624

Xerox Docket No. D/98439C

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Douglas N. Curry

Application No.: 10/025,671

Filed: December 26, 2001

On Appeal from Group: 2624

Examiner: A. Do

Docket No.: 101256.01

For: A SYSTEM AND METHOD FOR DIRECTED ACUITY SEGMENTATION RESOLUTION COMPRESSION AND DECOMPRESSION

APPEAL BRIEF TRANSMITTAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached hereto are three (3) copies of our Brief on Appeal in the above-identified application.

The Commissioner is hereby authorized to charge Deposit Account No. 24-0037 in the amount of Three Hundred Thirty Dollars ($330.00) in payment of the Brief fee under 37 C.F.R. 1.17(f). In the event of any underpayment or overpayment, please debit or credit our Deposit Account No. 24-0037 as needed in order to effect proper filing of this Brief.

For the convenience of the Finance Division, two additional copies of this transmittal letter are attached.

Respectfully submitted,

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Date: February 18, 2004

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Douglas N. CURRY	Group Art Unit: 2624
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BRIEF ON APPEAL

Appeal from Group 2624

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I. INTRODUCTION

This is an appeal from an Office Action mailed September 24, 2003, finally rejecting claims 1-6, 8, 9 and 13-18 of the above-identified patent application.

A. Real Party in Interest

The real party in interest in this appeal in the present application is Xerox Corporation, by way of an assignment recorded at reel/frame 9676/0946.

B. Statement of Related Appeals and Interferences

There are presently no appeals or interferences, known to Applicant, Applicant's representative or the Assignee, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

C. Status of Claims

Claims 1-18 are pending. The outstanding Office Action allowed claims 7 and 10-12. Claims 1-6, 8, 9 and 13-18 are on appeal. Of the claims that are on appeal, claims 1, 13 and 15 are independent claims. Claims 2-6, 8 and 9 depend from claim 1. Claims 14 and 18 depend from claim 13. Claims 16 and 17 depend from claim 15. Claims 1-18 are set forth in the attached Appendix.

D. Status of Amendments

The September 3, 2002 Amendment amended claims 1, 3, 7 and 15-17. The Amendment has been entered.

The December 30, 2002 Amendment After Final Rejection amended claims 1, 7, 10-12 and 15. The January 13, 2003 Advisory Action initially refused entry of the Amendment After Final Rejection.

The February 11, 2003 Request for Continued Examination requested consideration of the December 30, 2002 Amendment After Final Rejection. Both the Request for Continued Examination and the Amendment After Final Rejection have been entered.

The Amendment filed on April 2, 2003 amended claims 13 and 15 and added claim 18. The Amendment has been entered.

II. SUMMARY OF THE INVENTION AND APPLIED REFERENCES

A. Summary of the Invention

The invention is directed to a compression and decompression system and process for compressing and decompressing multibit per pixel image regions based on the type of data contained in the image region, e.g., whether the image region contains continuous tone data, including data to be halftoned, or non-continuous tone data, including antialiased text and lineart data. Segmented bytemap data blocks are processed to provide both low spatial resolution continuous tone data and high spatial resolution non-continuous tone data. See specification at page 4, lines 1-24.

The high spatial resolution non-continuous tone data is generated by quantizing and packing the high resolution bytes across an edge and discarding the high resolution bytes along the edge, i.e., the multibit data is discarded only in directions parallel to the edges of marks to be rendered in the image data. See specification at page 10, lines 1-14. Additional information indicating the directions of the edges in the image data are stored to aid in decompression. See specification at page 10, lines 15-31.

As variously claimed, during decompression, the non-continuous tone data is decompressed into a high spatial resolution bytemap by unpacking the high resolution across the edges and inferring the high resolution along the edges. See specification at page 19, lines 7-25. The low spatial resolution continuous tone data are processed to provide a low spatial resolution continuous tone data bytemap. See specification at page 21, lines 11-26.

As a result of the compression and decompression, the amount of memory necessary to store the non-continuous tone data may be reduced to a quarter of the memory necessary to store a conventional high spatial resolution bytemap. See specification at page 6, lines 1-13.

B. The Claimed Invention

The claimed invention is directed to methods and a system for decompressing image data. The image data is compressed by discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge. The image data represent a plurality of pixels, each pixel corresponding to a separate bitword. The image data is represented by a plurality of bitwords.

An exemplary embodiment of the invention provides a method for decompressing data from a compressed-data-bitword to provide data indicative of a plurality of explicit pixels and synthesizes data. The synthesis of data is from the data indicative of the plurality of explicit pixels. The method provides data corresponding to at least one synthesized pixel, the at least one synthesized pixel representing at least one discarded pixel.

Another exemplary embodiment of the invention provides a method for decompressing compressed image data that is compressed by discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge. The method decompresses a single byte of compressed data to produce four pixels of non-continuous tone data.

Another exemplary embodiment of the invention provides a decompression system for decompressing image data, the image data containing non-continuous tone data and continuous tone data, the non-continuous tone data compressed by discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge. The decompression system decompresses a data bitword-map to provide high spatial resolution data containing non-continuous tone data using extra resolution in a direction substantially perpendicular to an edge of marks. The decompression system decompresses the data bitword-map to provide low spatial resolution continuous tone data.

C. The Rejections

The Final Rejection rejects claims 1-6, 8 and 9 under 35 U.S.C. §103(a) over U.S. Patent 5,774,634 to Honma et al. (hereinafter, "Honma") in view of U.S. Patent 6,389,176 B1 to Hsu et al. (Hereinafter, "Hsu") and U.S. Patent 5,487,172 to Hyatt (Hereinafter "Hyatt"); claims 15-17 under 35 U.S.C. §103(a) over Honma in view of the Applicant's disclosure of related art, and Hyatt; and claims 13, 14 and 18 under 35 U.S.C. §103(a) over U.S. Patent 6,026,196 to Shannon et al. (hereinafter "Shannon") in view of Hyatt.

D. The Applied References

1. U.S. Patent 6,389,176 B1 to Hsu et al.

Hsu discloses an image/video enhancement system and method for transmission of the image/video. Hsu uses a pre-processor to increase the compression ratio of its compression scheme (Abstract).

Specifically, Hsu uses edge and feature extraction as shown in Fig. 4. Given the edge information, a dilation operation is applied to add the pixels to the boundary of the edges. Subsequently, Hsu applies an erosion operation to remove the pixels from the boundaries. Hsu applies the dilation operation and the erosion operation repeatedly "N times" (col. 5, lines 20-29). Hsu accomplishes this without any sense of parallel or perpendicular directionality relative to an edge. See Figs. 4 and 5.

This is reinforced by Hsu's disclosure of a discrete wavelet transform (DWT) which acts to hierarchally decompose the input signals into a series of successively lower resolution reference signals and their associated detail signals (col. 5, lines 30-42). Thus, Hsu et al. relates to dilation and erosion based on the contours extracted as edge information of the input signals, but does not relate to a parallel or perpendicular directionality relative to an edge.

2. **U.S. Patent 5,487,172 to Hyatt**

Hyatt discloses a transform processing system with transform algorithms and a detector arrangement provided for detecting a change condition and to bypass redundant processing operations (Abstract).

Hyatt discloses a motion of an edge, as illustrated in Fig. 9(J), from its prior edge position 970 to the next pixel position 971 (col. 205, lines 8-22). Hyatt's pixel fill operation regarding the pixels adjacent to the edge pixel (col. 205, line 60-col. 206, line 34) relates to the filling of the neighboring pixels as the edge position moves from its prior edge position 970 to the next edge position 971 (Fig. 9(J)). Hyatt's fill processing relates to color information of a pixel as the pixel edge position moves (col. 205, lines 43-50). Hyatt's disclosed fill operation does not relate to discarding of pixels along a parallel directionality relating to an edge. Further, Hyatt does not relate to pixel compression/decompression.

3. **U.S. Patent 5,774,634 to Honma et al.**

Honma relates to an apparatus and method in which plural gradation-information storage units are provided (Abstract).

Honma discloses a background art of compressing an image by means of a block formation and a decoding process using an international standard method of encoding a color still image (col. 1, lines 45-55).

4. **Patent 6,026,196 to Shannon et al.**

Shannon relates to utilizing a dither matrix to enhance the compressibility of raster images. Specifically, Shannon relates to dithering and scaling a color image into monochrome data (col. 2, lines 33-34).

Shannon dithers a color image into monochrome data by using the convention of white having gray level zero and black having gray level 255. "This convention is common

for monochrome printers where black dots are placed on a white page." (See col. 6, lines 8-21.) Shannon does not relate to decompressing of non-continuous tone data.

5. Applicant's Disclosure of Related Art

The present application discloses the related art in the area of non-continuous and continuous tone art information. The Description of Related Art section discloses that more spatial resolution is necessary to render non-continuous tone regions than is necessary to render continuous tone regions. (See specification at page 1, lines 15-25.)

III. THE ISSUES ON APPEAL

1. Whether claims 1-6, 8 and 9 are properly rejected under 35 U.S.C. §103(a) over Honma et al. in view of Hsu and Hyatt.

2. Whether claims 15-17 are properly rejected under 35 U.S.C. §103(a) over Honma in view of the Applicant's disclosure of the related art and Hyatt.

3. Whether claims 13, 14 and 18 are properly rejected under 35 U.S.C. §103(a) over Shannon in view of Hyatt.

IV. GROUPING THE CLAIMS ON APPEAL

Each claim of this patent application on appeal is separately patentable, and upon issuance of a patent will be entitled to a separate presumption of validity under 35 U.S.C. §282. For convenience in the handling of this appeal, the claims are grouped as follows:

Group I, claims 1-6 and 8-9.

Group II, claims 15-17.

Group III, claims 13, 14 and 18.

Each of Groups I-III are argued separately in the following arguments. The groups do not stand or fall together.

V. ARGUMENTS

A. Law on Obviousness under 35 U.S.C. §103(a)

In rejecting claims under 35 U.S.C. 103, it is incumbent on the examiner to establish a factual basis to support the legal conclusion of obviousness. See, In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), including: (A) determining the scope and content of the prior art; (B) ascertaining the differences between the prior art and the claims in issue; (C) resolving the level of ordinary skill in the pertinent art; and (D) evaluating evidence of secondary considerations.

In rejecting claims, the Patent Office bears the initial burden of persuasion in establishing a *prima facie* case of obviousness. To achieve this, the Patent Office must show three criteria: a suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine teachings; a reasonable expectation of success; and that the prior art must teach or suggest all claimed limitations. See In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See also MPEP §2143.

Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal Inc. v. F-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir. 1988), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note, In re Oetiker, 977

F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). The mere fact that the prior art may be modified in the manner suggested by the examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. In re Fritch, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992).

All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). A showing of a suggestion, teaching, or motivation to combine the prior art references is an "essential evidentiary component of an obviousness holding." C.R. Bard, Inc. v. M3 Sys. Inc., 157 F.3d 1340, 1352, 48 USPQ2d 1225, 1232(Fed. Cir. 1998). This showing must be clear and particular, and broad conclusory statements about the teaching of multiple references, standing alone, are not "evidence." See Dembiczak, 175 F.3d at 1000, 50 USPQ2d at 1617. However, the suggestion to combine need not be express and "may come from the prior art, as filtered through the knowledge of one skilled in the art." Motorola, Inc. v. Interdigital Tech. Corp., 121 F.3d 1461, 1472, 43 USPQ2d 1481, 1489(Fed. Cir. 1997).

"The inherent teaching of a prior art reference, a question of fact, arises both in the context of anticipation and obviousness. In re Napier, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995). The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). To rely on inherency, the examiner must "provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied art." In re Robinson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950 (Fed. Cir. 1999).

In applying 35 U.S.C. §103(a), the Patent Office must: (A) consider the claimed invention as a whole; (B) consider the references as a whole when determining whether the

references suggest the desirability of making a combination; (C) consider the references without the benefit of impermissible hindsight consideration of Applicant's disclosure; and (D) use a reasonable standard of success as the standard from which obviousness is determined. Hodosh v. Block Drug Co., Inc., 786 F.2d 1136, 1143, 229 USPQ 182, 187 (Fed. Cir. 1986).

In this regard, prior art must be viewed prospectively and not retrospectively using the patent as a blueprint to reconstruct the invention by indiscriminately picking and choosing parts and bits from the prior art. See, for example, Grain Processing Corp. v. American Maize-Products Co., 840 F.2d 902, 907, 5 USPQ2d 1788, 1792 (Fed. Cir. 1988) ("Care must be taken to avoid hindsight reconstruction by using 'the patent in suit as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the result of the claims in suit.' "). See also In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988) ("One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."). This is because "[t]o imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." W. L. Gore Associates Inc. v. Garlock, Inc., 721 F.2d 1540, 1553, 220 USPQ 303, 312-13 (Fed. Cir. 1983), *cert. Denied*, 469 U.S. 851 (1984). Instead, the well-established rule of law is that each prior art reference must be evaluated as an entirety and all of the prior art must be evaluated "as a whole." See W.L. Gore, 721 F.2d at 1550, 220 USPQ at 311.

Patent case law is clear that in considering the differences, the question is not whether the differences themselves would have been obvious, but rather whether the claimed invention "as a whole" would have been obvious. Stratoflex, Inc. v. Aeroquip Corp., 713

F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983). Distilling an invention down to the "gist" of the invention disregards the requirement of analyzing the subject matter "as a whole." W.L. Gore. In addition, it is irrelevant in determining obviousness that all or all other aspects of the claim may have been well known in the art. Medtronic, Inc. v. Cardiac Pacemakers, Inc., 721 F.2d 1563, 220 USPQ 97, 99-100 (Fed. Cir. 1983). The invention must be considered "as a whole."

In order to consider the invention "as a whole", the Examiner must consider the context in which the invention was made, problems solved by the invention and the like. See In re Antonie, 559 F.2d 618, 620, 195 USPQ 6, 8 (CCPA 1977) where it was held that in delineating the invention as a whole, one looks "not only to the subject matter literally recited in the claims...but also to the properties of the subject matter which are inherent in the subject matter and are disclosed in the specification." Also see In re Sponnoble, 405 F.2d 578, 585, 160 USPQ 237, 243 (CCPA 1969) where it was found that discovery of the source of a problem is also part of the "subject matter as a whole" inquiry. Moreover, a prior art reference must be considered in its entirety, i.e., as a whole, including portions that lead away from the claimed invention. W.L. Gore.

In order to fully answer the obviousness question and address the four Graham factors, the Examiner must determine who is "one of ordinary skill in the art." In considering the level of ordinary skill in the art, factors that may be considered include "(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field." Environmental Designs, Ltd. V. Union Oil Co., 713 F.2d 693, 696, 218 USPQ 865, 868 (Fed. Cir. 1983), *cert. Denied*, 464 U.S. 1043 (1984). The "importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry." Ryko Mfg. Co. v. Nu-

Star, Inc., 950 F.2d 714, 718, 21 USPQ2d 1053, 1057 (Fed. Cir. 1991). Thus, the Examiner must ascertain what would have been obvious to one of ordinary skill in the art at the time the invention was made, and not to the inventor, a judge or a layman." Environmental Designs.

B. Claims 1-6, 8 and 9 are Not Obvious over Honma in View of Hsu and Hyatt

Claims 1-6, 8 and 9 stand finally rejected under 35 U.S.C. §103(a) over Honma in view of Hsu and Hyatt.

Independent claim 1 recites, *inter alia*, "discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge, ... synthesizing data from the data indicative of the plurality of explicit pixels to provide the data corresponding to at least one synthesized pixel, the at least one synthesized pixel representing at least one discarded pixel."

In the September 24, 2003, Final Rejection, the Office Action admits that Honma fails to teach or suggest "discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge, and the at least one synthesized pixel representing at least one discarded pixel." (See the Office Action, page 3, lines 11-15.) For this deficiency, the Office Action relies on Hsu (col. 5, lines 23-25 and lines 51-59; and col. 3, lines 11-16), which discloses an erosion operation during object extraction, and a sampling decimation and interpolation as shown in Fig. 6. The Office Action also relies on Hyatt as shown in Fig. 9(J), which illustrates a pixel-fill process given a motion of an edge position 970 to the next pixel position 971 (see col. 206, lines 4-9 and lines 21-34).

The Examiner then draws a conclusion that "it would have been obvious for Honma to discard pixels along a direction parallel to an edge and maintain those along a direction perpendicular to the edge, and to represent the synthesized pixel by the discarded pixel as

taught by Hsu and Hyatt in order to reproduce high quality images." (See the Office Action, page 4, lines 6-9.)

Applicant respectfully disagrees with the Examiner's ultimate conclusions regarding claims 1-6, 8 and 9. Hsu and Hyatt fail to overcome the deficiencies of Honma with respect to these claims.

As discussed in Applicant's July 8 Request for Reconsideration, Hsu discloses extracting objects using dilation and erosion operations. See col. 5, lines 19 and 20. While the dilation operation adds pixels to the boundaries of edges, the erosion operation removes pixels from the boundaries. See col. 5, lines 20-25. Furthermore, these operations occur as a part of the edge and feature extraction disclosed by Hsu (col. 5, lines 4-20). For example, the edge information (Fig. 5(B)), the dilated edge (Fig. 5(C)) and the object extraction (Fig. 5(D)) disclosed by Hsu are feature extractions from the original image (Fig. 5(A)), but do not relate to discarding pixels in decompressing image data along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge, as variously recited in claims 1-6, 8 and 9. Therefore, Hsu does not supply the subject matter admitted as lacking in Honma.

Hyatt also fails to overcome the deficiencies of Honma. As discussed in Applicant's July 8 Request for Reconsideration, Hyatt discloses filling pixels between the prior edge and the next edge of a moving surface. See Fig. 9(J) and col. 204, lines 63-64. For example, Hyatt discloses that "for a moving trailing occulting edge, pixel words associated with the adjacent surface can be used to fill a pixel vacated by a trailing edge of a moving or occulting surface." (See col. 205, lines 35-39.) Contrary to the Office Action's assertion that Hyatt teaches removing pixels (Office Action at page 4, lines 1-5), Hyatt only fills a pixel vacated by a trailing, edge as discussed above. More significantly, by fill processing, Hyatt refers to changing of pixel fill information (col. 206, lines 16-18) relating to color information

(col. 205, lines 45-48), rather than synthesizing a pixel representing at least one discarded pixel, as claimed.

Accordingly, independent claim 1 is not obvious over Honma, either alone or in combination with Hsu and Hyatt. The applied references also fail to render obvious the subject matter of dependent claims 2-6, 8 and 9, which depend from base claim 1 and are allowable at least for their dependence thereon and for the additional features recited therein.

Reversal of the rejection under 35 U.S.C. §103(a) is therefore respectfully solicited.

C. Claims 15-17 are Not Obvious from Honma in View of the Applicant's Disclosure of Related Art and Hyatt

Claims 15-17 stand rejected under 35 U.S.C. §103(a) over Honma in view of the Applicant's disclosure of related art and Hyatt.

Independent claim 15 recites, *inter alia*, "the non-continuous tone data compressed by discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge, ... a decompressor that decompresses a data bitword-map to provide a high spatial resolution data containing non-continuous tone data using extra resolution in a direction substantially perpendicular to an edge of marks, and that decompresses the data bitword-map to provide a low spatial resolution continuous tone data."

In the September 24 Final Rejection, the Office Action admits that Honma fails to teach or suggest "using extra resolution in a direction perpendicular to an edge of marks to provide the high resolution data containing non-continuous tone data, and discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge." (See Office Action, page 6, lines 9-14.) For this deficiency, the Office Action relies on the Applicant's disclosure of related art regarding continuous and non-continuous tone art information. (See specification, page 1, lines 15-25; and page 2, lines 5-8.) The

Office Action also relies on Hyatt (Fig. 9(J); col. 206, lines 4-9 and 21-34; and col. 11, lines 32 and 34).

As previously discussed, Hyatt relates to a fill processing, i.e., changing pixel fill information regarding color information.

The Examiner reaches a conclusion that "it would have been obvious for Honma to use extra resolution in a direction perpendicular to an edge of marks to provide the high resolution data containing non-continuous tone data as taught by PAA and to discard pixels along a direction parallel to an edge and maintain those along a direction perpendicular to the edge as taught by Hyatt in order to reduce high quality images." (See Office Action, page 7, lines 4-8.)

Applicant respectfully disagrees with the Examiner's ultimate conclusions regarding claims 15-17. Applicant's disclosed related art and Hyatt fail to overcome the deficiencies of Honma with respect to these claims.

As discussed in the Applicant's July 8 Request for Reconsideration, the application discloses that a human viewer appreciates non-continuous tone art information and continuous tone art information differently. The Applicant's disclosed related art does not disclose, teach or suggest discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge, as recited in claims 15-17. Therefore, the Applicant's disclosure of related art does not supply the subject matter admitted as lacking in Honma.

As further discussed in the July 8 Request for Reconsideration, Hyatt discloses determining adjacent pixels of an edge pixel. However, as discussed above, Hyatt relates to changing pixel fill information, i.e., to changing color information, but does not relate to decompression involving non-continuous tone data using extra resolution in a direction substantially perpendicular to an edge of marks, as recited in claim 15.

Accordingly, independent claim 15 is not obvious from Honma et al., either alone or in combination with the Applicant's disclosure of related art and Hyatt. The applied references also fail to render obvious the subject matter of dependent claims 16 and 17, which depend from base claim 15 and are allowable at least for their dependence thereon and for the additional features recited therein.

Reversal of the rejection under 35 U.S.C. §103(a) is therefore respectfully solicited.

D. Claims 13, 14 and 18 are Not Obvious from Shannon et al. in View of Hyatt

Claims 13, 14 and 18 stand rejected under 35 U.S.C. §103(a) over Shannon in view of Hyatt.

Independent claim 13 recites, *inter alia*, "discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge, ... decompressing a single byte of compressed data to produce four pixels of non-continuous tone data."

In the September 24 Final Rejection, the Office Action admits that Shannon fails to teach or suggest "discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge." (See Office Action, page 8, lines 1 and 2.) For this deficiency, the Office Action relies on Hyatt. (See Fig. 9(J); and col. 206, lines 4-9 and 21-34.)

The Examiner reaches a conclusion that "it would have been obvious for Shannon to discard pixels along a direction parallel to an edge and maintain those along a direction perpendicular to the edge as taught by Hyatt in order to reduce the processing bandwidth." (See Office Action, page 8, lines 6-9.)

Applicant respectfully disagrees with the Examiner's ultimate conclusions regarding claims 13, 14 and 18.

As discussed in the Applicant's July 8 Request for Reconsideration, Hyatt fails to overcome the deficiencies of Shannon. Hyatt discloses determining adjacent pixels to an edge pixel. But, as discussed in detail above, Hyatt relates to fill processing of pixel color information, but does not relate to compressing by discarding pixels along a direction parallel to an edge, or to decompressing a single byte of compressed data to produce four pixels of non-continuous tone data, as recited in claim 13.

Even if combined, Shannon and Hyatt would not have resulted in the claimed features. Shannon relates to dithering of a color image to convert into a monochrome data. (See col. 2, lines 31-34.) Thus, the monochrome data disclosed by Shannon does not have tone information. As disclosed in the Applicant's description of related art, non-continuous tone art information relates not only to spatial resolution, but also to color information. (See specification at page 1, lines 15-19.) The dithering according to Shannon strips such color information from the source color image to derive the monochrome data. This dithered image is sent to the printer and no record of the dithered image or the source color image remains available to the driver. (See Shannon et al. at col. 2, lines 32-34.)

Accordingly, independent claim 13 is not obvious over Shannon, either alone or in combination with Hyatt. The applied references also fail to render obvious the subject matter of dependent claims 14 and 18, which depend from base claim 13 and are allowable at least for their dependence thereon and for the additional features recited therein.

Reversal of the rejection under 35 U.S.C. §103(a) is therefore respectfully solicited.

VI. Conclusion

For at least the reasons discussed above, it is respectfully submitted that claims 1-18 contain patentable subject matter and are distinguishable over the applied references.

Applicant respectfully requests the Honorable Board to reverse the final rejection of the claims and return the application to the Examiner to pass this case to issue.

Respectfully submitted,

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JAO:RJK/jth

Date: February 18, 2004

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Enclosure:
Appendix of Claims

APPENDIX A

CLAIMS:

1. A method for decompressing image data, that is compressed by discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge, representing a plurality of pixels and represented by a plurality of bitwords, each pixel corresponding to a separate bitword, the process comprising:

decompressing data from a compressed-data-bitword to provide data indicative of a plurality of explicit pixels; and

synthesizing data from the data indicative of the plurality of explicit pixels to provide data corresponding to at least one synthesized pixel, the at least one synthesized pixel representing at least one discarded pixel.

2. The method of claim 1, wherein decompressing a quantity of non-continuous tone data is increased to approximately four times of a quantity of uncompressed non-continuous tone data present in a plurality of bitwords representing a plurality of pixels.

3. The method of claim 1, wherein, during decompression, non-continuous tone data with a high spatial resolution in one dimension is decompressed into a high spatial resolution bitword-map with reference to information indicating the direction of the edge within the image data.

4. The method of claim 1, wherein, decompressing the data from the compressed bitword for a single data pixel comprises:

identifying a bit word as continuous tone data; and

decompressing continuous tone data to provide image data for a single pixel at a higher spatial resolution corresponding to a plurality of pixels.

5. The method of claim 4, wherein, decompressing the data from the compressed bitword for a single data pixel comprises:

synthesizing bitwords of information corresponding to discarded non-continuous tone data; and

copying the single pixel to provide the image for the surrounding pixels.

6. The method of claim 1, wherein each of the bitwords are bytes.

7. A method for decompressing image data, that is compressed by discarding pixels along a direction parallel to an edge, representing a plurality of pixels and represented by a plurality of bitwords, each pixel corresponding to a separate bitword, the process comprising:

decompressing data from a compressed-data-bitword to provide data indicative of a plurality of explicit pixels; and

synthesizing data from the data indicative of the plurality of explicit pixels to provide data corresponding to at least one synthesized pixel, the at least one synthesized pixel representing at least one discarded pixel,

wherein each of the bitwords are bytes;

wherein decompressing the data from the compressed bitword comprises:

referencing a segmentation bit of the bitword to determine whether the bitword contains non-continuous tone data;

referencing a direction bit to determine whether the direction of the edge located in spaced relationship to a first and a second pixel;

referencing a three-bit value indicative of the first pixel; and

referencing a three-bit value indicative of the second pixel.

8. The method of claim 6, wherein, for each bitword, synthesizing the data is performed in either a fastscan direction or a slowscan direction based on a direction bit contained in that bitword.

9. The method of claim 8, wherein, synthesizing the data comprises determining which pixel positions are to be synthesized during decompression based on the direction bit.

10. A method for decompressing image data, that is compressed by discarding pixels along a direction parallel to an edge, representing a plurality of pixels and represented by a plurality of bitwords, each pixel corresponding to a separate bitword, the process comprising:

decompressing data from a compressed-data-bitword to provide data indicative of a plurality of explicit pixels; and

synthesizing data from the data indicative of the plurality of explicit pixels to provide data corresponding to at least one synthesized pixel, the at least one synthesized pixel representing at least one discarded pixel;

wherein each of the bitwords are bytes;

wherein for each bitword, synthesizing the data is performed in either a fastscan direction or a slowscan direction based on a direction bit contained in that bitword;

wherein synthesizing the data comprises:

determining which pixel positions are to be synthesized during decompression based on the direction bit;

rendering from each bitword twice as many pixels in a direction perpendicular to an edge indicated by the direction bit of that bitword.

11. A method for decompressing image data, that is compressed by discarding pixels along a direction parallel to an edge, representing a plurality of pixels and represented by a plurality of bitwords, each pixel corresponding to a separate bitword, the process comprising:

decompressing data from a compressed-data-bitword to provide data indicative of a plurality of explicit pixels; and

synthesizing data from the data indicative of the plurality of explicit pixels to provide data corresponding to at least one synthesized pixel, the at least one synthesized pixel representing at least one discarded pixel;

wherein wherein each of the bitwords are bytes;

wherein for each bitword, synthesizing the data is performed in either a fastscan direction or a slowscan direction based on a direction bit contained in that bitword;

wherein synthesizing the data comprises:

determining which pixel positions are to be synthesized during decompression based on the direction bit;

when the direction bit indicates a vertical edge, using the three-bit value associated with the first pixel and the three-bit value associated with the second pixel in the compressed-data-bitword to determine slope in the fast scan direction to render the vertical edge.

12. A method for decompressing image data, that is compressed by discarding pixels along a direction parallel to an edge, representing a plurality of pixels and represented by a plurality of bitwords, each pixel corresponding to a separate bitword, the process comprising:

decompressing data from a compressed-data-bitword to provide data indicative of a plurality of explicit pixels; and

synthesizing data from the data indicative of the plurality of explicit pixels to provide data corresponding to at least one synthesized pixel, the at least one synthesized pixel representing at least one discarded pixel;

wherein each of the bitwords are bytes;

wherein for each bitword, synthesizing the data is performed in either a fastscan direction or a slowscan direction based on a direction bit contained in that bitword;

wherein synthesizing the data comprises:

determining which pixel positions are to be synthesized during decompression based on the direction bit;

when the direction bit indicates a horizontal edge, using the three-bit value associated with the first pixel and the three-bit value associated with the second pixel in the byte of compressed data to determine slope in the slow scan direction to render the horizontal edge.

13. A method for decompressing compressed image data that is compressed by discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge, the method comprising:

decompressing a single byte of compressed data to produce four pixels of non-continuous tone data.

14. The method of claim 13, further comprising, transmitting the byte of data to a print engine where the step of decompressing is performed, the step of decompressing including extracting data necessary to render two non-continuous tone data pixels and fabricating two more non-continuous tone data pixels in a low-spatial resolution direction based on a set of values of the extracted data.

15. A decompression system for decompressing image data, the image data containing non-continuous tone data and continuous tone data, the non-continuous tone data compressed by discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge, the system comprising:

a decompressor that decompresses a data bitword-map to provide high spatial resolution data containing non-continuous tone data using extra resolution in a direction substantially perpendicular to an edge of marks, and that decompresses the data bitword-map to provide low spatial resolution continuous tone data.

16. The decompression system of claim 15, further comprising an image forming device, wherein the decompression system is incorporated in the image forming device.

17. The decompression system of claim 16, wherein the image forming device is one of at least a facsimile machine, a laser printer, an inkjet printer, a digital copier or a full-width-print bar printer.

18. The method of claim 13, wherein the four pixels represent a two-by-two pixel array.